IntelliDrive Webinar

Safety Applications for Commercial Vehicles

January 20, 2010
Agenda

- Introduction – Jon Mueller, FMCSA
- Overview of IntelliDrive – Brian Cronin, ITS/JPO
- IntelliDrive for Commercial Vehicles – Jon Mueller
- V2V Research Plan – Alrik Svensson, NHTSA
- V2I Overview – Tom Kearney, FHWA
- CV IntelliDrive Project – Rick McDonough, NYSDOT
- IntelliDrive CV Working Group – Alrik Svensson
- Questions & Answers
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Overview of IntelliDrive

Brian Cronin
Team Lead
RITA ITS/JPO
Overview of IntelliDrive

♦ IntelliDrive Scope
  ● Safety
  ● Mobility
  ● Environment
Overview of IntelliDrive

 Responsibilities within the US DOT

- Research and Innovative Technology Administration (RITA)
- Intelligent Transportation Systems (ITS)/Joint Program Office (JPO)
- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- National Highway Traffic Safety Administration (NHTSA)
- Federal Transit Administration (FTA)
IntelliDrive<sub>SM</sub> is Connectivity

Drivers

Vehicles

Infrastructure

Wireless Devices
It’s All About Connectivity

- Real Time Network Data
- Situation Relevant Information
- Signal Phase and Timing
- Probe Data
- Instrumented Roadside
- E-payment
- Safety Messages

Opportunity for Innovation

- Real Time Network Data
- Situation Relevant Information
DSRC = Dedicated Short Range Communication “5.9 GHz”

DOT is committed to the use of the DSRC technologies for active safety for both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) applications.

All wireless technologies for applicability to safety, mobility, and environmental applications will be explored.

Connectivity to include both DSRC and non-DSRC+

Key Benefits of DSRC:
- Low latency communication (< 50ms)
- High data transfer rates (3 – 27 Mbps)
- Up to 1000m and 360°
What Can IntelliDrive SM Do for You?

Mobility Benefits
- V2I, I2V Interactivity (SPAT)
- Data-Rich Environment
- Operations Efficiency
- Traffic, Transit, Parking
- Weather
- Performance Management

Environmental Benefits
- Reduce Emissions
- Save Fuel

Safety Benefits
- Increase Driver Situational Awareness
- Reduce or Eliminate Crashes
  - Driver Advisories
  - Driver Warnings
  - Vehicle Safety Controls
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IntelliDrive
for Commercial Vehicles

Jon Mueller
General Engineer
FMCSA
IntelliDrive for Commercial Vehicles

♦ Examples of IntelliDrive Applications

● Vehicle to Vehicle (V2V)
  - Forward Collision Warning
  - Blind spot Detection
  - Lane Change Warning
  - Do Not Pass Warning

● Vehicle to Infrastructure (V2I)
  - Intersection Safety
  - Run-off Road Prevention
  - Smart Roadside
    ● USDOT Truck Parking Programs
      - SmartPark
    ● Automated Enforcement
      - Wireless Roadside Inspections

OPPORTUNITY

♦ A collision with a vehicle in transport was the first harmful event in 75% of all fatal crashes involving large trucks.*

♦ At full coverage and full effectiveness, IntelliDrive could save thousands of lives per year.

*FMCSA 2007 Large Truck and Bus Crash Facts
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IntelliDrive Vehicle to Vehicle Safety Applications
Research Plan

Alrik L. Svenson
Research Engineer
NHTSA
Vehicle to Vehicle Communications for Safety

- The dynamic wireless exchange of data between nearby vehicles that offers the opportunity for significant safety improvements

Latitude, longitude, time, heading angle, speed, lateral acceleration, longitude acceleration, yaw rate, throttle position, brake status, steering angle, headlight status, turn signal status, vehicle length, vehicle width, vehicle mass, bumper height.
V2V Safety Research Plan Goals

- Employ advanced V2V wireless technologies to mitigate or prevent crashes
- Establish robust DSRC standards for safety-critical applications
- Accelerate in-vehicle technology to ensure value for the first V2V vehicles
Research Outcomes

- Potential benefits of V2V technologies
- Develop practical, DSRC-based, V2V active safety applications
- Complete standards and solutions for security, scalability, positioning, and other technical issues
- Develop the driver-vehicle interface to minimize distraction and driver workload
- Develop aftermarket or retrofit solutions to accelerate V2V technology into all vehicles in the fleet
- Develop factual evidence to support NHTSA rulemaking decision in 2013
V2V Safety Application Research Tracks

- Track 1 – Crash Scenario Framework
- Track 2 – Interoperability
- Track 3 – Benefits Assessment
- Track 4 – Application Development
- Track 5 – Driver Issues
- Track 6 – IntelliDrive Policy Issues
- Track 7 – Commercial Vehicle
- Track 8 – Transit Vehicle
Track 7
Commercial Vehicles

♦ Goals

● Develop a plan that is responsive to the needs of the commercial heavy vehicle industry stakeholders

● Conduct research activities to resolve the technical and policy issues impeding the accelerated deployment of V2V based safety systems for commercial vehicles

♦ Plan is organized similarly to the overall V2V plan with tracks to outline major areas and milestones
Commercial Vehicle V2V Research Tracks

- Track 7a – Crash Scenario Framework
- Track 7b – Application Development/Benefits Assessment
- Track 7c – Interoperability
- Track 7d – Human Factors/Driver Issues
- Track 7e – Planning & Outreach
- Track 7f – Policy
  - NHTSA CV regulatory decision in 2013
CV V2V Safety Applications Research Plan

Commercial Vehicle V2V Safety Application Research Plan

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<th>TRACK 7a</th>
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<td>Identify Priority CV Crash Scenarios</td>
<td>Select Critical Safety Applications</td>
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<th>Application Development/Benefits Assessment</th>
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<td>Develop Performance Requirements</td>
<td>Develop Objective Test Procedures</td>
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<td>Estimate Safety Benefits</td>
<td>Consume Information for Feedback</td>
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<td>Develop and Build Prototype Safety Application Vehicles</td>
<td>Testing</td>
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<td>Performance • Interoperability • Driver Acceptance</td>
<td>Develop Final Performance Specifications &amp; Test Procedures</td>
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<th>TRACK 7c</th>
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<td>Develop CV DFV Guidelines</td>
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<td>CV Stakeholder Workshop • Primary Safety Applications/Interoperability</td>
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<td>CV Stakeholder Coordination Meeting</td>
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<td>Coordination with IntelliDrive™ Policy Issues – Security, Retrofit &amp; Aftermarket, Enforcement, Governance</td>
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Summary

- NHTSA, in cooperation with other U.S. DOT modal administrations, has begun research on V2V communications for safety as part of the IntelliDrive Program.
- V2V has the potential for significant safety benefits for all vehicles.
- Both NHTSA and FMCSA are conducting research on commercial vehicle V2V to support regulatory decisions on these systems in 2013.
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IntelliDrive℠ CVO/ Freight

Vehicle to Infrastructure Overview

Tom Kearney
Transportation Specialist
FHWA
V2I – CVO/Freight

- IntelliDrive℠ CVO/Freight addresses the safety and the mobility aspects of commercial vehicle operations
- Benefits of IntelliDrive℠ CVO/Freight include “Smart Freight” component and more efficient intermodal freight linkages
- Advanced under the FHWA/FMCSA “Smart Roadside Initiative”
- Designed to support more effective and efficient enforcement activities safeguarding health of highway infrastructure and equity in the transport industry
- Includes not only automated enforcement but services to the commercial vehicle operator (Truck Parking, Road Weather and Operating Conditions Information, etc.)
- Compatibility with Private Sector Telematics
- V2I CVO/Freight Research “Roadmap” being developed
Roadside Programs/Projects Coordinated via Smart Roadside Initiative

- CVISN
- C-TIP
- Virtual Weigh Stations And E-Screening
- Container Tracking
- Wireless Inspections
- ATIS
- E-Tolling
- USDOT Truck Parking Programs
- CLARUS
- EFM
Recurring Congestion: 2035
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Commercial Vehicle Infrastructure Integration

a.k.a.
Commercial Vehicle IntelliDrive

Richard McDonough
Office of Modal Safety & Security
NYS Department of Transportation
Commercial Vehicle Infrastructure Integration (CVII) Program

- I-95 Corridor Coalition funded program
- Complete interoperability! Communicate with any VII compliant vehicle or infrastructure
- Integrate VII communications device w/SAE J1708 commercial vehicle data bus
- Compliant/utilize the standard message sets SAE J1587, SAE J1939 and SAE 2735
- Project started May 2009
- Two year schedule for Phase 1
- CVII Advisory Team established
CVII Program – Phase 1

- Develop/Test CV VII compliant onboard equipment (OBE) systems including Highway Vehicle Implementations (HVI) for basic communication of general info (V2I/I2V)

- Develop/Test CV 5.9 GHz DSRC Applications:
  - CV Driver I.D. and Verification (V2I)
  - Wireless Vehicle Safety Inspection Info (V2I)
  - CV to Maintenance Vehicle Comm. (V2V)
CVII Program – Phases 2 and 3

♦ Phase 2 – Pending/Scope Negotiations
  • Heavy Vehicle to Light Vehicle Driver Safety Warnings

♦ Phase 3 – Initiated/Funding Approved
  • 5.9GHz Interoperability with CVISN compatible (existing) 915 MHz Virtual Weigh Stations/Electronic Screening Systems
CVII Phase 2:
1. V2V Enhanced Active Safety

- Passenger Vehicles/CV exchange heartbeat messages
- Warning scenarios:
  - Potential Blind Spot Warnings
  - Hard Braking Events (multiple vehicles ahead)
  - Tailgate warning
CVII Phase 2:
2. V2V Enhanced Active Safety

- CV analyzes heartbeats of nearby vehicles and sends an unsafe to pass message to trailing vehicle
- Ideal for rural/undivided highways
CVII Phase 2:
3. Enhanced Active Safety (Safe to Merge)

- The passenger car is overtaking the CV
- The CV includes weight and/or stopping distance in its heartbeat and we display a message to the driver of the pass-car when it is ok to merge in front of the CV.
- HMI could be shown as a Red-Yellow-Green zone
NYSDOT Long Island Expressway IntelliDrive Test Bed
NYS IntelliDrive/CVII Corridors
Kapsch/NYS DOT/NYS ERDA
Commercialization of Aftermarket 5.9 GHz Device

Task # X.
Develop Aftermarket 5.9 GHz DSRC In-Vehicle Systems with Vehicle Databus Integration
Using Smart Phones for Driver Communication (Human Machine Interface)
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The U.S. DOT invites interested stakeholders in the commercial vehicle industry to work with the Department on IntelliDrive in the areas of:

- Safety
- Mobility
- Environment

Opportunity to contribute to the research, development, and implementation of IntelliDrive

Separate subgroups are being formed for each of these research areas
Commercial Vehicle IntelliDrive Workshop

- Held in conjunction with the April 2010 CVSA Spring Workshop in San Antonio, TX
- U.S. DOT CV IntelliDrive Workshop: April 21, 2010
- Meeting information will be posted at [www.cvsa.org](http://www.cvsa.org)
- Presentations on current commercial vehicle Intellidrive plans and projects
- First CV Working Group meeting
For more information on the commercial vehicle working group or the April Workshop contact:

- Alrik Svenson, NHTSA, Alrik.Svenson@dot.gov
- Jon Mueller, FMCSA, Jon.Mueller@dot.gov
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